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Sustainable transport and the role(s) of performance indicators

TRB, Annual meeting, January, 2008
Washington DC
Session 677 - Performance Measures for Sustainability

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DTU Transport
Institut for Transport

Overview

1. Constructing ’sustainable transport’
2. The roles of performance indicators
    - Possible roles – Actual roles
3. Examples
    - Monitoring Stockholm Congestion Charging trial
    - European Unions ’TERM’ indicators
4. Conclusions

1. Constructing ’sustainable transport’

- Is a definition possible – and needed?
- Context matters
- ’Back to the basics’, Brundtland; Dimensions, etc
- A proposed assessment framework

a sustainable transport system...

- allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations;

- is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development;

- limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes while minimising the impact on the use of land and the generation of noise.

European Council (transport) 2001

Why no 'correct' definition?

- A political concept, not exact
- Sustainability comes in different varieties
- System boundaries
- Transport is only part of the equation

"There is no such thing as a generally accepted definition of 'sustainable transport', and it is doubtful whether one would – or could – ever exist"

(Peter Nijkamp et al 2004)

Why not ’anything goes’?

- Not everything can be bio-physically sustained
- Not everthing is acceptable
- Transport is a key element for sustainability concerns
- Some core elements are now widely accepted

’Back to basics’ …

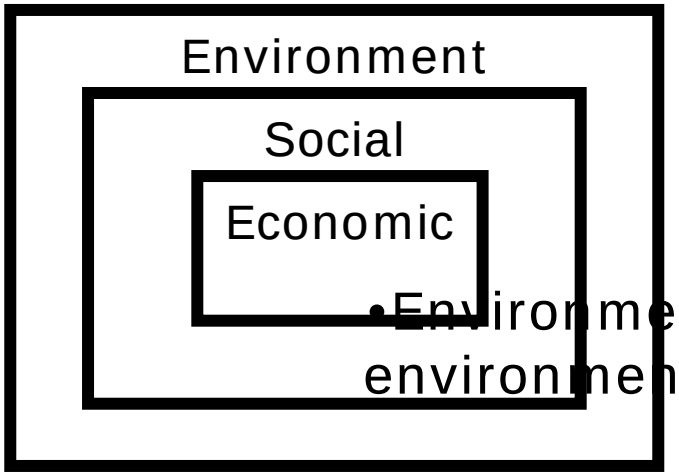
“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. “

“(…) It contains within it two key concepts:

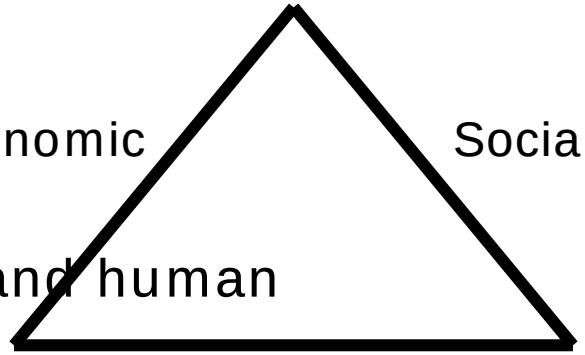
- The concept of “needs” in particular the essential needs of the world’s poor, to which overriding priority should be given, and
- The idea of limitations imposed by the state of technology and social organisation on the environment’s ability to meet present and future needs”

(WCED 1987, p. 43)

Four dimensions

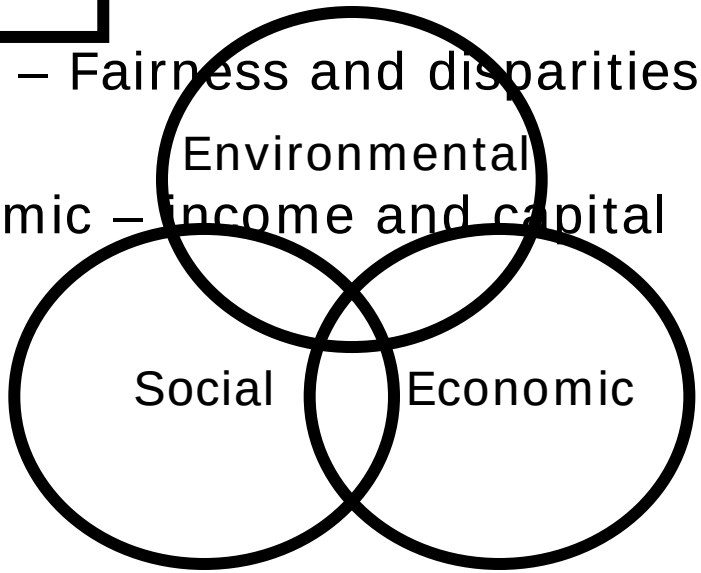


Hierarchy



Trade-off

- Environment – ecosystems and human environment
- Social – Fairness and disparities
- Economic – income and capital



Overlap

Institutional

Sustainable Dev. Assessment matrix

	Present generation ('Development')	Future generations ('Sustainability')
Environ-mental	Environmental quality and health for the present generation	Nature's life-support systems
Economic	Income in monetary terms	Income opportunities for future generations (capital assets)
Social	Human development apart from income Absolute poverty	Fairness for future generations
Institu-tional	Involvement of major stakeholder groups	Representation of future concerns
	Policy Integration	

Environmental impacts of concern for ST (EU COST ACTIONS 350+ 356)

1. Climate change
2. Land take, landuse
3. Hydraulic risk / hydrological changes
4. Visual qualities of landscape/townscape, light pollution
5. Habitat fragmentation (biota and humans)
6. Air pollution (primary and secondary)
7. Soil and water pollution: drinking water, agriculture and recreation
8. Noise: short-term noise emission, vibration, quiet areas
9. Non-renewable resource use
10. Waste
11. Perceived pollution: Odour, soiling, visibility
12. Ecotoxicity
13. (Human health)
14. (Traffic safety)

http://cost356.inrets.fr/

2. The roles of Performance indicators

- Indicators as elements in operationalization
- Intended roles, Actual roles
- Analytic framework for assessing roles

“Indicare”

- *To: point out*, *inform*, *show*, *declare*, *disclose*, *make known*, *reveal*, ...*betray* (!)

Key elements of indicator definitions

- The role of an indicator as *a sign or pointer*
- The notion of indicators as *variables*
- The capacity of indicators to *represent* some broader (perhaps 'hidden') field of interest or system
- The element of *selection* and *construction*
- The role to help *decisions and actions*

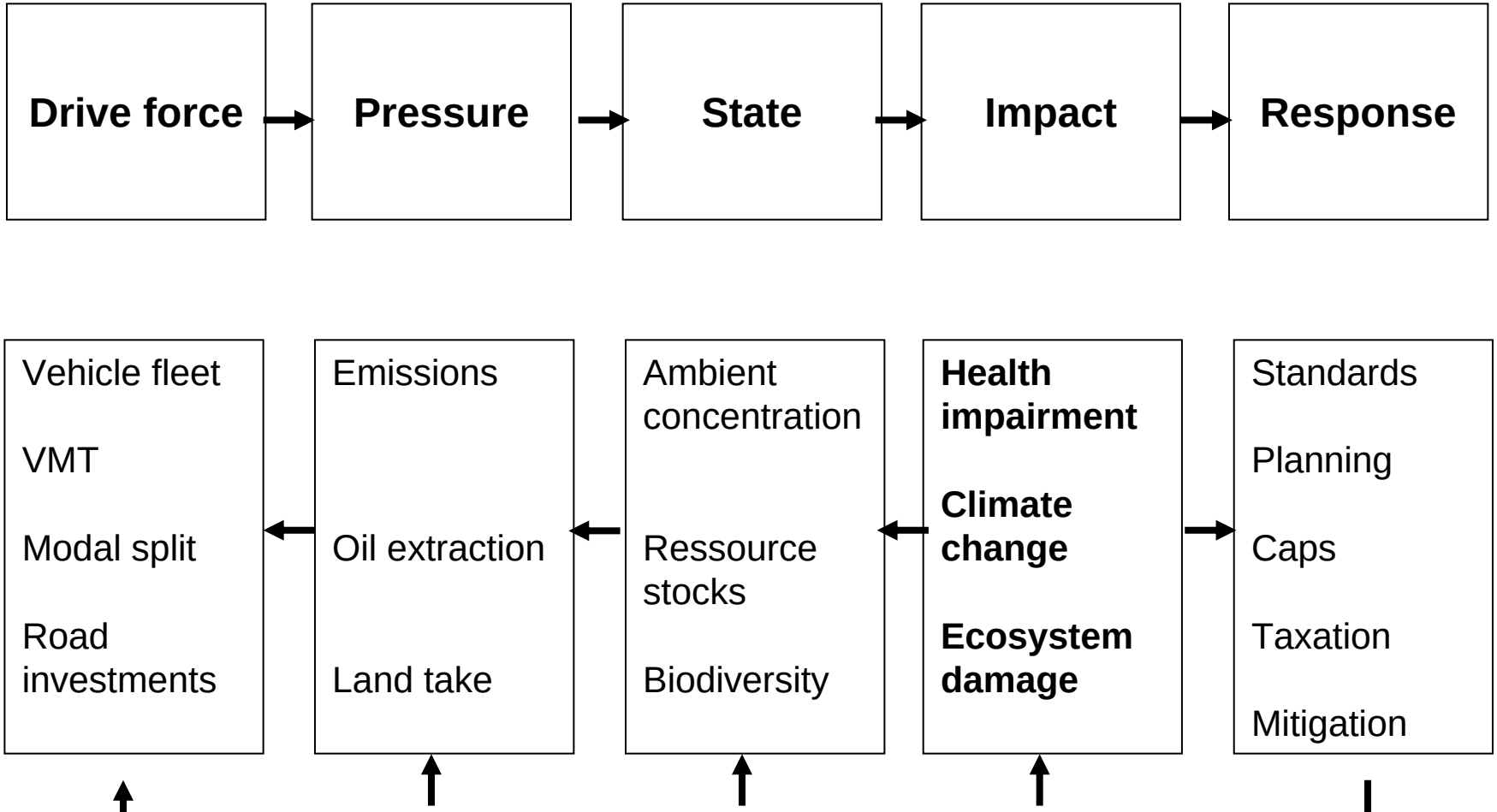
Performance indicators

- The relation of a measured variable to a norm, standard, objective or target
- of relevance for decisions made by particular organizations or processes

Context matters for how to operationalize

- Transport does not always affect all 'impact cells'
- Ideal endpoints (e.g impacts) are not always operational for incremental decision making
- Political objectives can set different priorites
- Political juristictions can provide different opportunities

Representation by 'chain of causality'



Intended roles of ST performance indicators

TRB STI Subcommitee 2008:

- Allowing communities to compare themselves with others,
- Analyzing trends,
- Evaluating policy with regard to sustainability goals

Johnston 2008:

- Sustainability assessment of modeled transportation and land use projects
- Sustainability assessment of policy packages

Aparicio 2008:

- Focus the attention of decision makers on the environmental performance of the sector
- Communicate to the public about key challenges and strategies
- Improve co-operation with regional and local governments

Actual role of policy information (1)

"A substantial literature on knowledge utilization documents how little, on the whole, formal analysis and information influence decisions"

(Judy Innes 1998)

[our research…] "… confirms the hypothesis that political decision makers gather information and **do not use it**; ask for more information and **ignore it**; make decisions first and look for relevant information **afterwards**; and, collect and process a great deal of information that has little or **no direct relevance** to decisions"

(Sager & Ravlum 2005)

Actual roles of policy information (2)

Instrumental role

- To guide decision making towards appropriate action

Symbolic role

- To justify decisions or non-decisions

Enlightenment role

- To inspire decision making processes to consider new things, or old things in new ways

No role

- To collect dust…..

Influence factors for indicators

- Conceptual factors: Clear idea of what is being represented and measured, a ‘theory’
- Operational factors: Data quality and availability; strategy for how and and when to measure, verify, update
- Communicative factors: Dissemination, vizualisation, timing, appropriate aggregation
- Institutional factors: Standardized information channels, links to decision processes and budgets, etc.

(inspired by Judy Innes 1990)

Hypotheses about indicator roles

	Instru-mental	Symbolic	Enlighten-ment	None
Conceptua-lisation				
Operatio-nalization				
Communi-cation				
Institutio-nalisation				

3. Examples

- Stockholm Congestion Charging trial
- European Union 'Environmental integration' policy
- [UK 10 year Plan for Transport/local transport plans]

Methods:

- Document analysis
- Interviews with key participants

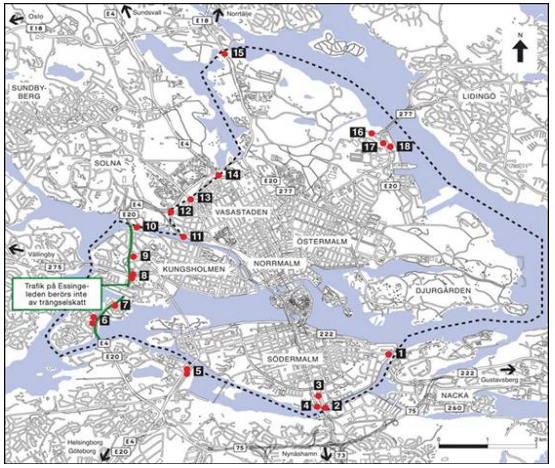
a) Stockholm Concestion trial evaluation

Trial January- July 2006

Objectives:

- Reduce traffic volumes by 10-15% on the most congested roads
- Increase the average speed
- Reduce emissions of harmful pollutants and carbon dioxide
- Improve the urban environment as perceived by Stockholm residents

- Referendum sept 17, 2006
- Permanent program from august 2007



Evaluation program

- Purpose: To verify if objectives were fulfilled
- Developed in cooperation with different actors
- Prior and during trial
- More than 30 different evaluation tasks
- Scientifically designed and carried out by experts
- Montly indicator reports – continuous follow-up
  - Car travel flows and travel times
  - Public transit passengers
  - Cyclists
  - Parking space utilization
  - Retail trade effects

Influence factors present

Conceptua-lisation	Clearly defined measurement program for specified pocliy issues
Operatio-nalization	Intensive data collection before, during, after
Communi-cation	Almost instant reporting of key result indicators, extensive communication strategy, involvement of press, reference groups
Institutio-nalisation	Clear reponsibilities, relative independce of monitoring unit, requirement to use results for specified decision

Interpretation

- Extensive use of indicators
- Clear performance relevance (even if no targets)
- All influence factors identified
- Instrumental role detected (also via referendum)

- Sustainable transport promoted?

- yes, partially and incrementally

b) EU environmental integration monitoring

- European Environment Agency's 'TERM' reports
- Purpose: to monitor strategies to **integrate environmental concerns in transport policies** in the European Union (30+ countries)
- Annual reports since 2001
- Indicator based (ca 35 indicators)

The seven TERM questions:

1. Is the environmental performance of transport improving?
2. Are we getting better at managing transport demand and modal split?
3. Are spatial and transport planning becoming better coordinated so as to match transport demand to the need for access?
4. Are we optimising the use of existing transport infrastructure capacity and moving towards a better-balanced intermodal transport system?
5. Are we moving towards a fairer and more efficient pricing system, which ensures that external costs are internalised?
6. How rapidly are cleaner technologies being implemented and how efficiently are vehicles being used?
7. How effectively are environmental management and monitoring tools being used to support policy- and decision-making?

TERM Indicators (1)

	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09
TERM 01 - Transport final energy consumption by mode								C	C	C
TERM 02 - Transport emissions of greenhouse gases									C	C
TERM 03 - Transport emissions of air pollutants									C	C
TERM 04 - Exceedances of air quality objectives due to traffic									C	C
TERM 05 - Exposure to and annoyance by traffic noise									N	
TERM 06 - Fragmentation of ecosystems and habitats by transport infrastructure									?	
TERM 07 - Proximity of transport infrastructure to designated areas									?	
TERM 08 - Land take by transport infrastructure									?	
TERM 09 - Transport accident fatalities								C		C
TERM 10 - Accidental and illegal discharges of oil at sea										
TERM 11a - Waste from road vehicles (ELV)										
TERM 11 - Waste oil and tires from vehicles										
TERM 12a - Passenger transport								C	C	C
TERM 12b - Passenger transport modal split by purpose								C	C	C
TERM 13a - Freight transport								C	C	C
TERM 13b - Freight transport modal split by group of goods								C	C	C
TERM 14 - Access to basic services										
TERM 15 - Regional accessibility of markets and cohesion										
TERM 16 - Access to transport services										
TERM 18 - Capacity of infrastructure networks									C	
TERM 19 - Infrastructure investments								C		

Available on WWW | No indicator | Available on CIRCA | Soon to be available | Under development

TERM Indicators (2)

Indicator	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09
TERM 20 - Real change in transport prices by mode								C		C
TERM 21 - Fuel prices and taxes								C		C
TERM 22 - Transport taxes and charges									C	
TERM 23 - Subsidies										
TERM 24 - Expenditure on personal mobility by income group								C		
TERM 25 - External costs of transport								C		
TERM 26 - Internalization of external costs									C	
TERM 27 - Energy efficiency and specific CO2 emissions										C
TERM 28 - Specific emissions										C
TERM 29 - Occupancy rates of passenger vehicles									C	
TERM 30 - Load factors for freight transport									C	
TERM 31 - Uptake of cleaner and alternative fuels									C	C
TERM 32 - Size of the vehicle fleet									C	
TERM 33 - Average age of the vehicle fleet										C
TERM 34 - Proportion vehicle fleet meeting certain emission standards									C	
TERM 35 - Implementation of integrated strategies										
TERM 36 - Institutional cooperation										
TERM 37 - National monitoring systems										
TERM 38 - Implementation of SEA										
TERM 39 - Uptake of environmental management systems by transport companies										
TERM 40 - Public awareness										

Influence factors present

Conceptua-lisation	Clearly defined measurement program for specified issues, related to policy issues
Operatio-nalization	Intensive data collection, but delays and variation in definitions and availability of data
Communi-cation	Annual report, speeches, and some attempts to activate politicians, but limited effort compared to scope
Institutio-nalisation	Independence, but low degree of policy adoption and linkage, no formal requirements to use the indicator report, no 'natural' policy venue

Interpretation

- ’Freestanding’ indicator reporting
- Substantial coverage of environmental sustainability
- Performance relevance (no/few targets)
- Few influence factors identified
- Only ’symbolic’ role in policy making detected
- ’Enlightenment’ role for national monitoring systems

- Sustainable transport promoted?

- yes, symbolically but less so instrumentally

Conclusions (1)

- Impossible to define sustainable transportation in the absolute
- Nevertheless: transport is a problem and should be assessed against sustainability dimensions and criteria
- Priority to impacts on natural life support systems (including the climate system), and absolute poor
- To be approproiate indicators should reflect sustainability concerns;
- To become influential they should also reflect policy context
- Sustainability relevance and policy relevance pose conflicting demands on indicators

Conclusions (2)

- Intended roles are not always fulfilled
- Instrumental role is a tough act to play
- Symbolic role is not irrelevant
- Enlightenment role may be the most important

The area remains full of tensions:

- Ideal aims versus incremental change
- Comprehensiveness versus managability
- Independence versus influence

…but please don't give up!

End